

Fig.1.

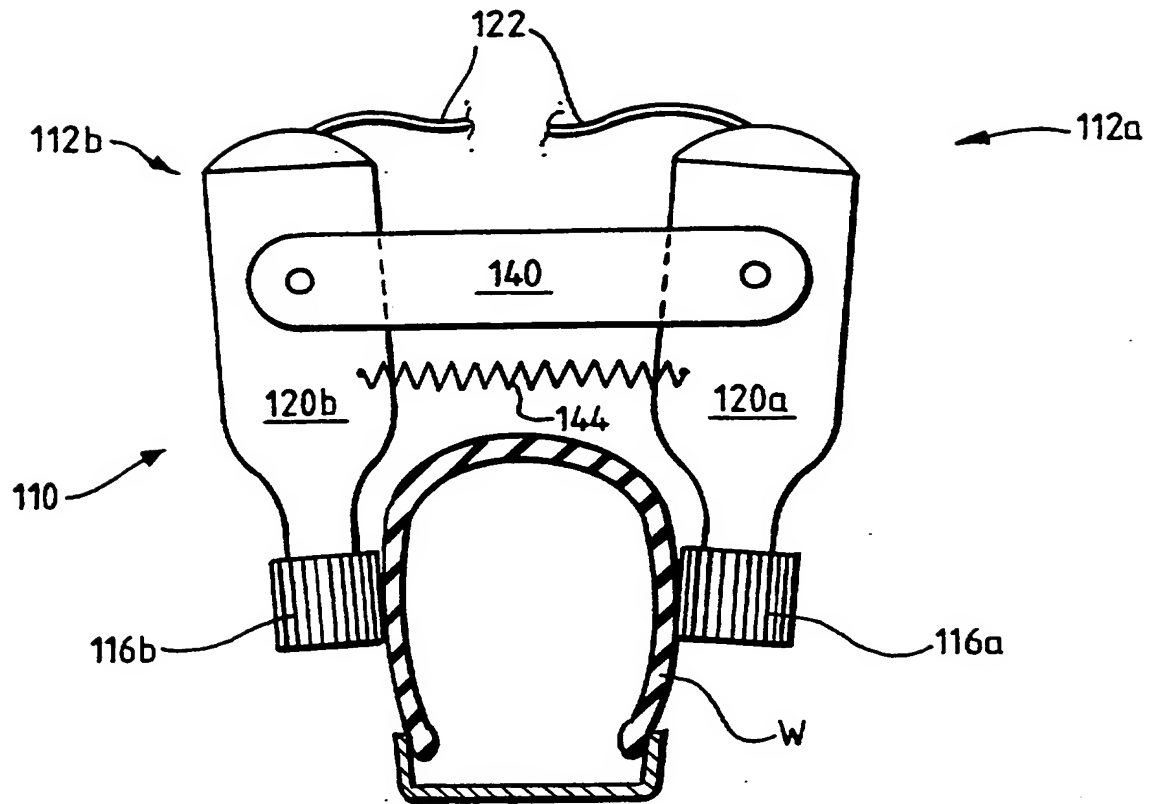


Fig. 2.

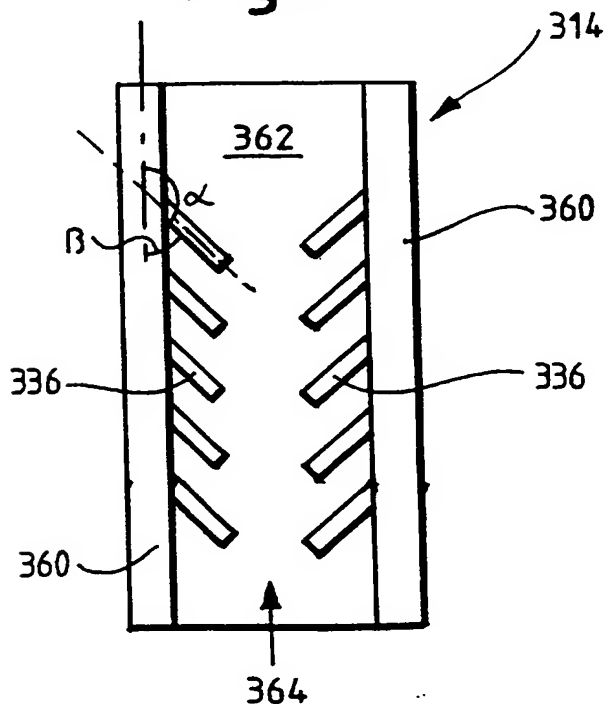
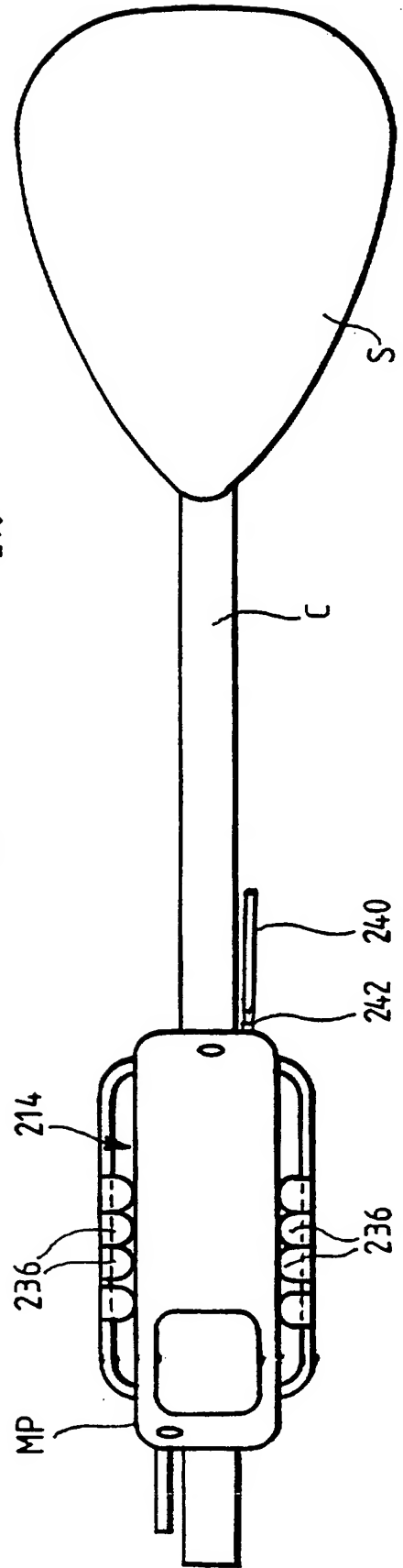
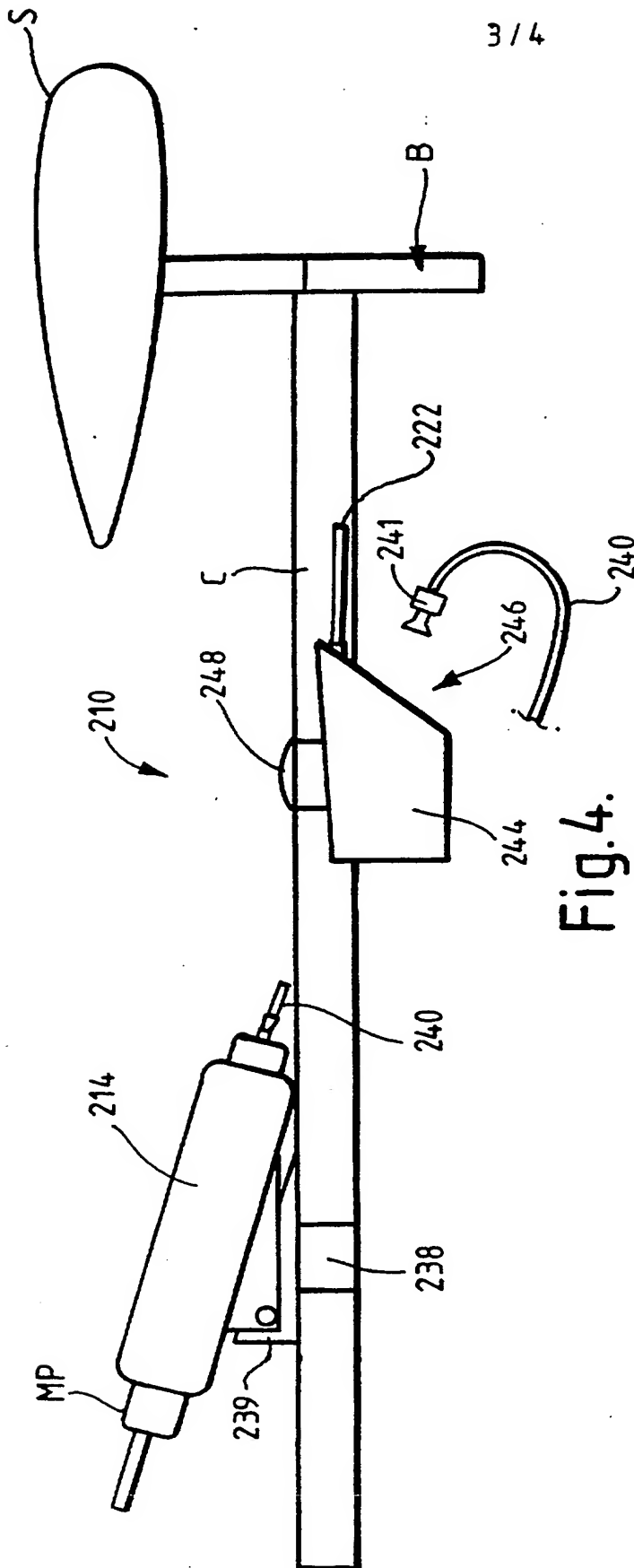


Fig. 9.



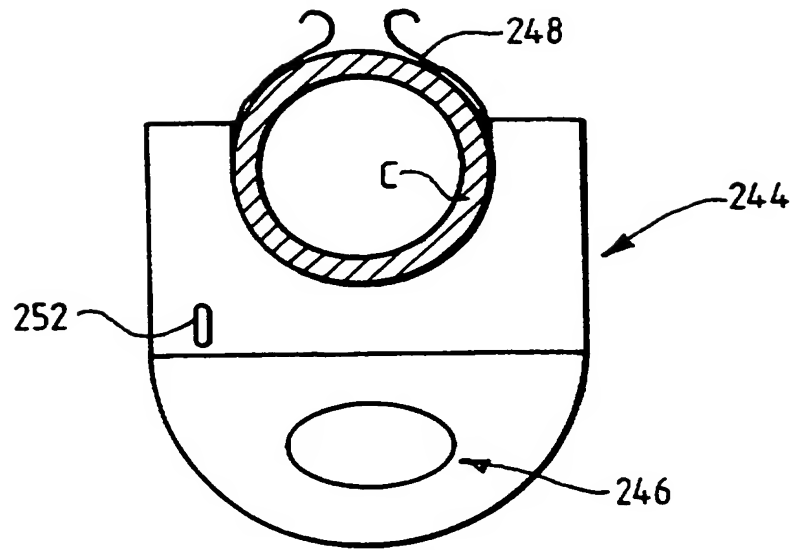


Fig.5.

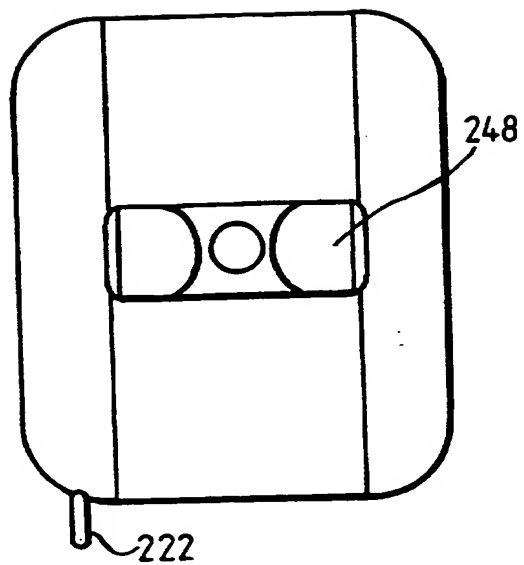


Fig.6.

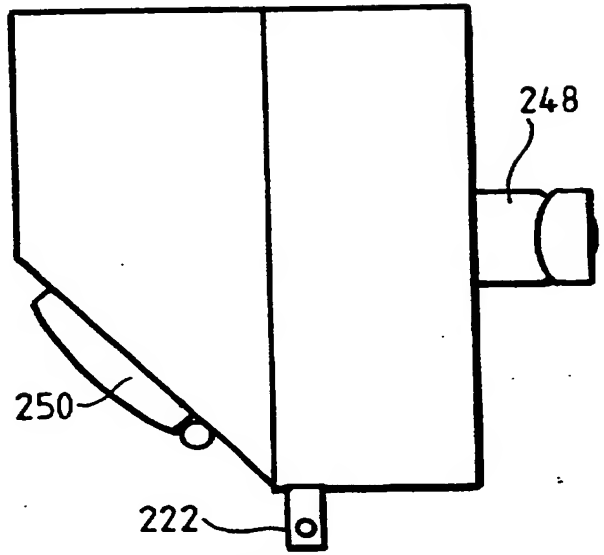


Fig.7.

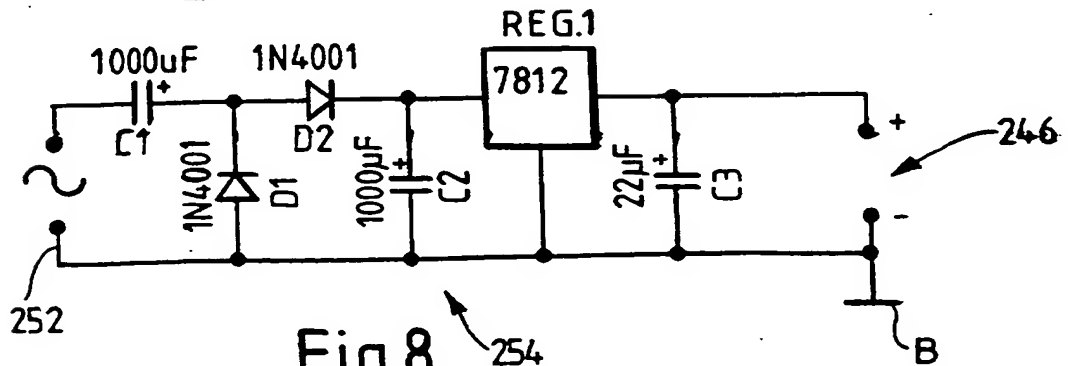


Fig.8.

# IMPROVEMENTS IN CHARGING MOBILE PHONES

The invention relates to improvements in charging mobile phones and in particular, but not exclusively, to a device for charging a mobile phone using a bicycle.

It is known to provide recharging units for mobile phones which comprise a plug for connecting the unit to mains supply electricity. These recharging units comprise a rectifier and step down transformer in order to charge a DC battery such as a 12 volt battery within the mobile phone. However such systems are limited to use where mains electricity is available. It is also known to provide a recharging unit which runs on the "cigarette lighter" socket in a vehicle. Typically, the output in such sockets is twelve volts and the recharging unit conveys this electrical energy to the mobile phone for storage within the in-built dry cell battery. Again, such recharging units are limited for use with a specific socket in a vehicle.

The invention seeks to provide a recharging unit which is more widely applicable and for example can be used on a bicycle.

A first aspect of the invention provides a device for charging a mobile phone comprising an electrical generator, or dynamo, and means for generating electricity suitable for charging a mobile phone battery, such as direct current electricity, and an output enabling connection of the device to a mobile phone thereby to enable supply of electricity to the mobile phone, for example for recharging when the dynamo is in use.

Preferably the unit comprises means such as a support bracket for attaching the dynamo adjacent a moving part such as a bicycle wheel. Preferably the bracket comprises means such as a spring device to enable movement of the dynamo between a position in biased or resilient contact with the moving part and a position away from the moving part or wheel.

Preferably the device comprises a rectifier to produce DC output from the dynamo. Preferably the charging device comprises electrical storage means such as a dry cell battery which can be charged when the device is used and in particular when the mobile phone is not connected to the output from the device. Accordingly, a control circuit according to the invention preferably comprises one or more of an AC rectification circuit, a voltage multiplication circuit such as a voltage doubling circuit, a voltage regulator and/or a voltage smoothing circuit.

In one form, the device comprises a holder or cradle for receiving the phone which cradle preferably comprises an output connection to the phone socket thereby to enable supply of electrical power to the phone for example to charge the in-built battery in the phone.

Another aspect of the invention provides a bicycle comprising a device according to the first aspect of the invention.

Another aspect of the invention provides a kit of parts for assembly into a charging device according to the first aspect of the invention.

Another aspect of the invention provides a generator having two heads for engaging a moving part, and preferably means such as a spring resiliently to bias the heads against the moving part.

A further aspect of the invention provides a device for holding a mobile phone comprising a housing adapted to receive the mobile phone and an arrangement for attachment of the device to part of a bicycle frame. Preferably the housing comprises a mechanism or means for holding or gripping the mobile phone in place. Preferably the gripping means comprises one or more resilient elements or fingers adapted to abut the mobile phone when located in the housing.

In one particular form, a series of flexible gripping elements is provided to secure the mobile phone in the housing preferably the series of gripping elements are angled to provide a barbed effect thereby to assist in retaining the mobile phone in the housing.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:



FIGURE 1 is a schematic perspective view of a device according to the invention;

FIGURE 2 is a schematic end elevation view of part of a dynamo for a charging device according to the invention;

FIGURE 3 is plan view of part of a bicycle comprising part of a third embodiment of the device according to the invention;

FIGURE 4 is a side elevation view of the arrangement shown in FIGURE 3;

FIGURES 5, 6 and 7 are different elevation views of a control unit shown in FIGURE 4 performing part of the invention;

FIGURE 8 is schematic circuit diagram of circuitry within a control unit shown in FIGURES 5, 6 and 7; and

FIGURE 9 is a schematic front elevation of a third embodiment of a cradle according to the invention.

Referring to Figure 1 there is shown a charging device 10 according to the invention attached to an arm A forming part of the frame of the bicycle. Device 10 comprises a dynamo 12 and means for holding a mobile phone in the form of holder or cradle 14.

Dynamo 12 comprises a rotatable head or wheel 16 attached to a spindle 18 which carries a coil (or magnet) as is known for a dynamo or generator. The dynamo 12 also comprises a body 20 housing a coil or magnet to co-operate with the coil or magnet carried by spindle 18 in the known manner thereby to generate an electrical output at wire 22 to holder 14. Dynamo 12 carried on a bracket 24 comprising means to enable the dynamo 12 to be positioned resiliently biased towards wheel W to effect rotation of wheel 16 in use and also to be positioned away from the wheel W thereby to prevent rotation of wheel 16 when electrical power is not required. Bracket 24 for example can be clamped to arm A of the bicycle using a second plate 26 and attaching means such as nuts and bolts.

Beneficially, bracket 24 can also carry holder 14 which principally comprises a rectifier 28, electrical storage means such as dry cell battery 30 and electrical output 32 for co-operating with a mobile phone socket to supply electricity thereto. Holder 14 comprises a sheath 34 which is sufficiently rigid to enable a mobile phone to be mounted in holder 14 and maintain a connection between a mobile phone and output plug 32.

In use, generator 12 is positioned adjacent wheel W and movement of the bicycle effects generation of electricity which passes through wire 22 to rectifier 28. The electrical power can then be stored in battery 30 and or passed through to a mobile phone (not shown) via output 32.

Referring to Figure 2 there is shown an embodiment of part of a device 110 according to the invention which comprises a pair of generators 112a and 112b each comprising a head or rotatable wheel 116 and body 120.

The individual dynamos are mounted on a plate 140 which can for example be mounted above a wheel W on a bicycle frame. Plate 140 and the dynamo bodies 120 a and b comprise means 144 for co-operating to enable positioning of the dynamo wheels 116 both in engagement with wheel W and out of engagement therewith. Preferably the separation of wheels 116 a and b from one another is sufficiently adjustable to enable compensation for different widths of wheel W. For example the dynamo bodies 120 a and b can be connected by a spring 144 to enable the bodies to be resiliently pulled towards each other and thereby grip wheel W. But also an over-centre position of the bodies 120 enables them to be maintained out of contact with wheel W.

Referring to Figures 3-8, there is shown a further embodiment of a device 210 according to the invention which briefly comprises a dynamo or dynamos not shown but which can be identical to dynamo 12 or 112a and b for example. The

dynamos are connected via a lead 222 to a control unit 244 which in turn connects to a mobile phone MP which can be held in a cradle 214.

Referring to Figures 3 and 4, it can be seen that beneficially cradle 214 can be mounted on the crossbar C of bicycle frame B. Ideally the cradle 214 can be mounted between the saddle S and handlebars and thus can be very accessible to a cyclist. The cradle 214 preferably comprises means for gripping the mobile phone such as a series of fingers 236 resiliently biased (for example by springs) to grip the mobile phone within the cradle 214. In this embodiment a series of four fingers 236 is shown on each side of the mobile phone MP. Cradle 214 is connected to the crossbar C using a clamp or bracket 238 which can comprise a pair of spring clips for example which cooperate to grip to the crossbar but which enables release therefrom. The bracket 238 can comprise a pivotal connection 239 to enable adjustment of the horizontal position of cradle 214.

The device 210 comprises a lead, wire or cable 240 having a jack plug 242 for connection to the mobile phone MP. The cable 240 connects the mobile phone to the control unit 244 and comprises a further plug 241 at its end remote from the mobile phone. Plug 241 can for example be a known plug adapted for cigarette lighter socket and accordingly a socket 246 can therefore be provided within control unit 244 to enable interconnection of the mobile phone MP with the control unit 244. Beneficially therefore, plug 241 and socket 246 can comprise a readily available cigarette lighter plug and socket.

Plug 241 can comprise electronic components such as filtration, smoothing, and/or regulation circuits to ensure a suitable voltage is passed along cable 240 to a mobile phone MP. Indeed, plug 241 can comprise monitoring, feedback and/or control circuits to monitor the status of the mobile phone MP. Moreover, plug 241 can be a proprietary plug purchased by a user for a specific mobile phone which plug is intended to recharge and/or power a mobile phone MP from a cigarette lighter socket provided in a vehicle.

Control 244 beneficially comprises a mounting bracket or clip 248 for attachment to the crossbar C. As shown in Figure 4, the control units 244 can beneficially be placed on the underside of the crossbar C and towards the saddle S thereby to minimise any restriction to the cyclist in use. Control units 244 further comprises a socket 252 for interconnection with a dynamo unit via a wire or cable 222. Beneficially, socket 246 can be adapted to carry a cap 250 when not in use, to protect against ingress of unmounted elements into the socket. Also, brackets 248 and 238 can comprise an arrangement of co-operating apertured plates and nuts and bolts for example.

Referring to Figure 8, there is shown a schematic circuit diagram of an electrical circuit 254 which can be housed within the control unit 244. The circuit 254 comprises an AC input such as socket 252 which is interconnected to a dynamo. Typically, a dynamo might generate a AC voltage of approximately 6 volts. A voltage doubling and rectification circuit is formed by capacitor C1 and diodes D1 and D2. For example, capacitor C1 might be an electrolytic capacitor having a capacitance of approximately 1000 micro Farads whereas diodes D1 and D2 might

be IN4001 devices for example. The voltage doubling and rectification circuit is connected across a smoothing capacitor C2 which can for example comprise an electrolytic capacitor of a capacitance of about 1000 micro Farads. The output from the smoothing capacitor C2 is connected across a regular REG1 such as a 7812 device which regulator restricts the voltage output therefrom across the capacitor C3 and therefore output terminal 246. Output capacitor C3 can be an electrolytic capacitor having a capacitance in the order of 22 micro Farads for example. The DC output port 246 comprising a positive and negative output terminals can form output socket 246 of control unit 244 thereby to provide DC output via jack plug 241 to the mobile phone MP via cable 240.

Beneficially, mobile phones typically require a DC input of between 9 and 24 volts. Accordingly, it will be appreciated that circuit 254 can be adapted to provide an output voltage between these levels and in accordance with the level of the input voltage.

Referring to Figure 9 there is shown a third embodiment of the device for holding a mobile phone or cradle 314 according to the invention.

Cradle 314 comprises a pair of side walls 360 and a back plate 362 which define a U-shaped receiving slot 364 for accommodating a mobile phone MP. Additionally, cradle 314 comprises a series of elements or fingers 336 for gripping a mobile phone when located in slot 364. In this embodiment a series of five fingers 336 is provided along the inside of each of side walls 360. The body of the cradle

314 formed by plate 362 and side wall 360 can for example be made of a relatively rigid thermoplastic material which can be suitably moulded into shape and comprises recesses or through-bores for fingers 336. Preferably, fingers 336 are formed from a resilient and/or flexible material such as rubber or mouldable thermoplastic which forms a flexible or rubber like element after moulding. Accordingly, cradle 314 can be formed using a double-moulding process.

Referring in more detail to the series of fingers 336 shown in cradle 314, preferably opposite rows are provided i.e. on each side of the cradle. However, one side might not be provided with such gripping elements. One or more gripping fingers 336 can be provided on one or both sides of the slot 364. Preferably, three or more gripping fingers are provided and in a preferred form five such elements are provided. The gripping fingers 336 preferably subtend the side wall 360 at an angle  $\beta$ . Preferably the angle  $\beta$  is less than  $90^\circ$ . More preferably the angle  $\beta$  is in the order of  $30^\circ$ - $60^\circ$  and in one form can be substantially  $45^\circ$ .

Where two or more fingers 336 are provided, preferably the angle  $\beta$  for each is substantially the same. Moreover, where two or more fingers 336 are provided they preferably have substantially the same length and therefore project substantially the same distance away from the inside surface of a side wall 360.

**Claims**

1. A device for charging a mobile phone comprising an electrical generator, or dynamo, and means for generating electricity, such as direct current electricity, suitable for charging a mobile phone battery and an output enabling connection of the device to a mobile phone thereby to enable supply of electricity to the mobile phone, for example for recharging when the dynamo is in use.
2. A device according to Claim 1 which further comprises means such as a support bracket for attaching the dynamo adjacent a moving part such as a bicycle wheel.
3. A device according to Claim 2 wherein the bracket comprises means such as a spring device to enable movement of the dynamo between a position in biased or resilient contact with the moving part and a position away from the moving part or wheel.
4. A device according to Claim 1, 2 or 3 which further comprises a rectifier to produce DC electrical output from the dynamo.
5. A device according to Claim 1, 2, 3 or 4 which further comprises electrical storage means such as a dry cell battery which battery is chargeable when the device is used and in particular when the mobile phone is not connected to the output from the device.



6. A device according to any preceding claim comprising one or more of an AC rectification circuit, a voltage multiplication circuit such as a voltage doubling circuit, a voltage regulator and/or a voltage smoothing circuit.
7. A device according to any preceding claim comprising a holder or cradle for receiving the phone, which cradle preferably comprises an output connection to the phone socket thereby to enable supply of electrical power to the phone for example to charge the in-built battery in the phone.
8. A bicycle comprising a device according to any preceding claim.
9. A kit of parts for assembly into a charging device according to any of Claims 1 to 7.
10. A generator having two heads for engaging a moving part, and preferably means such as a spring resiliently to bias the heads against the moving part.
11. A device for holding a mobile phone comprising a housing adapted to receive the mobile phone and an arrangement for attachment of the device to part of a bicycle frame.

12. A device according to Claim 11 wherein the housing comprises a mechanism or means for holding or gripping the mobile phone in place.

13. A device according to Claim 12 wherein the gripping means comprises one or more resilient elements or fingers adapted to abut the mobile phone when located in the housing.

14. A device according to Claim 13 wherein a series of flexible gripping elements is provided to secure the mobile phone in the housing preferably the series of gripping elements are angled to provide a barbed effect thereby to assist in retaining the mobile phone in the housing.

15. A control circuit for a device according to any of Claims 1 to 14 comprising one or more of an AC rectification circuit, a voltage multiplication circuit such as a voltage doubling circuit, a voltage regulator and/or a voltage smoothing circuit.

16. A holder or cradle for receiving a mobile phone which cradle preferably comprises an output connection to the phone socket thereby to enable supply of electrical power to the phone for example to charge the in-built battery in the phone.



Application No: GB 9925745.3  
Claims searched: 1 to 9

Examiner: Nik Dowell  
Date of search: 17 August 2000

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.R): H2H - HBCB, HBCH,  
Int Cl (Ed.7): B62J - 6/00, 6/06, 6/12, 39/00 ; H02J - 7/14  
Other: Online : WPI, EPODOC, PAJ

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2 345 596 A (Tihngang) see whole document	1,4,5
X	GB 2 245 437 A (Nodic-Matsumoto progress) see abstract	1,5,7
X	GB 2 124 441 A (Finch & Everett) see especially page 3, lines 51 to 56	5
X	EP 0 786 849 A1 (Labimex) see abstract	1,4
X	WO 98/42060 A1 (Yoo) see abstract	1,4
X	US 4 069 451 A (Rouse) see especially column 2, lines 5 to 13	1 to 4, 6 and 8

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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